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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/083,385	02/27/2002	Satoshi Hirahara	220049US0	4760

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1940 DUKE STREET
ALEXANDRIA, VA 22314

EXAMINER

VO, HAI

ART UNIT	PAPER NUMBER
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1771

DATE MAILED: 04/21/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/083,385

Applicant(s)

HIRAHARA ET AL.

Examiner

Hai Vo

Art Unit

1771

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-40 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-40 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date: _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date: _____ | 6) <input type="checkbox"/> Other: _____ |

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miwa et al (US 4,851,304) in view of Koshany et al (US 6,183,898). Miwa teaches a porous electrode substrate for fuel cell comprising a carbonaceous fiber mat impregnated with a resin wherein the carbonaceous fiber made from polyacrylonitrile fiber having a fiber diameter of 4 to 9 microns within the claimed range (abstract, column 5, line 37). Miwa teaches the porous substrate having a thickness and resistivity in the thickness direction within the claimed ranges (table 4). Miwa teaches the substrate comprising carbonaceous fiber bonded to one another by an organic binder in an amount of 20 wt%, within the claimed range (table 1). Miwa teaches the organic binder being a combination of self curable resin and non-self curable resin wherein the non-self-curable resin is mixed at a proportion of 50 to 300 parts by weight based on 100 parts by weight of the self-curable resin (column 8, lines 35-39). Accordingly, the self-curable resin is present in an amount of 5 to 13 wt% and the non-self-curable present in an amount of 15 to 7wt% within the claimed range. Miwa does not specifically teach a basic weight of the carbonaceous fiber. Therefore, it is necessary and thus obvious for the skilled artisan to look to the prior art for the suitable basic weight of the carbonaceous fiber. Koschany teaches a porous gas

diffusion electrode comprising carbonized fiber with a basic weight less than 150 g/m² within the claimed range (column 2, lines 43-55). Such is also taught by Koschany to provide the lightweight electrode having desired open porosity, which is important to the expectation of successfully practicing the invention of Miwa and thus suggesting the modification. In the absence of unexpected results, it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the carbonized fiber with a basic weight instantly claimed, motivated by the desire to provide the lightweight electrode having desired open porosity.

Miwa does not specifically teach the carbonaceous fibers in the form of woven fabrics. Koschany teaches a porous gas diffusion electrode comprising carbonized fiber in the form of woven fabrics (column 2, line 40). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the carbonized fibers in the form of woven fabrics because such is an intended use of the material and Koschany provides necessary details to practice the invention of Miwa.

Miwa as modified by Koschany does not specifically teach the bending resistance and degree of fluffing of the carbonaceous fiber sheet. However, it appears that the electrode substrate of Miwa as modified by Koschany is made of the materials having the same composition as the conductive carbonaceous fiber sheet of Applicants. Further, Miwa and Applicants are using the same process to produce the carbonaceous fiber (column 7, line 40 et seq.). The conductive carbonaceous fiber sheet has the thickness, basic weight and resistivity in the

thickness direction within the claimed ranges. Since the composition, thickness, basic weight and resistivity altogether dictate a bending resistance and degree of fluffing of the conductive carbonaceous fiber sheet, it is not seen that the bending resistance and degree of fluffing would have been outside the claimed range when the thickness, basic weight and resistivity are within the claimed ranges and the two articles are formed from the same composition. Additionally, Miwa does not specifically teach the air permeability of the substrate. However, since air permeability is predicted from porosity and fiber diameter and the Miwa substrate has the porosity and fiber diameter within the claimed ranges, it is the examiner's position that the air permeability would be inherently present. It seems from the claim, if one meets the structure recited, the properties must be met or Applicant's claim is incomplete. This is in line with *In re Spada*, 15 USPQ 2d 1655 (1990) which holds that products of identical chemical composition can not have mutually exclusive properties.

With regard to claims 26 and 27, Miwa as modified by Koschany does not specifically disclose the processing steps as recited in the claims. However, it is a product-by-process limitation not as yet shown to produce a patentably distinct article. It is noted that if the applicant intends to rely on Examples in the specification or in a submitted Declaration to show non-obviousness, the applicant should clearly state how the Examples of the present invention are commensurate in scope with the claims and how the Comparative Examples are commensurate in scope with Miwa/Koschany.

3. Claims 38 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miwa et al (US 4,851,304) and Koshany et al (US 6,183,898), as applied to claim 1 above, further in view of Schultz (US 3,960,601). Miwa is silent as to the orientation of the carbonized fibers. Schulz, however, the fuel cell electrode produced from highly oriented carbonaceous fibers to have higher thermal stability and electrical conductance (column 11, lines 65-68), which is important to the expectation of successfully practicing the invention of Miwa, thus suggesting the modification. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the highly oriented carbonized fiber as taught in the Schulz reference for the randomly dispersed carbonized fiber, motivated by the desire to provide the electrode having higher thermal stability and electrical conductance.
4. Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miwa et al (US 4,851,304) and Koshany et al (US 6,183,898), as applied to claim 1 above, further in view of Kato (US 6,127,059). Miwa is silent as to the carbonized fibers made from twisted yarns. Kato, however, teaches a gas diffusion layer for a solid polymer electrolyte fuel cell comprising carbonaceous fibers formed from twisted yarns (column 3, lines 40-45). Kato also discloses that carbon fiber woven cloth and carbonized fibers are equivalent fibers for use in fuel cell electrodes. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the carbon fiber woven cloth for the randomly

Art Unit: 1771

dispersed carbonized fiber of the Miwa invention since these two fibers have been shown in the art to recognized equivalent fibers for use in fuel cell electrodes.

Response to Arguments

5. Applicant's arguments with respect to claims 1-36 have been considered but are moot in view of the new ground(s) of rejection.
6. The art rejections in the previous Office Action have been overcome by the present arguments (pages 10 and 11 of the amendment filed on 02/11/04).
7. It is noted that the recitation "the carbonaceous fibers are oriented and/or axially oriented" is inherently supported by the lines present on the surface of the sheet shown in figure 2. Since the limitation is not a new matter, the examiner suggests that Applicant should incorporate it in the original specification to provide sufficient antecedent basis for this limitation in the claims.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US 5,648,027 to Tajiri et al discloses a porous carbonaceous material and a method for producing the same.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hai Vo whose telephone number is (571) 272-1485. The examiner can normally be reached on M,T,Th, F, 7:00-4:30 and on alternating Wednesdays.

Art Unit: 1771

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Terrel Morris can be reached on (571) 272-1478. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

HV

Hai Vo